QUALIFICATION SPECIFICATION SECTION A							
QUALIFICATION DEVELOPER	Ministry Of Employment, Labour Productivity and Skills Development						
TITLE	Certificate III in Solar Energy.				**NCQF LEVEL**	3	
FIELD	Manufacturing, Engineering and Technology			**SUBFIELD:**	Solar Energy		
NEW QUALIFICATION	✓	Review of new qualification					
SUB-FRAMEWORK	General Education		TVET	✓	Higher Education		
QUALIFICATION TYPE	Certificate	✓	Diploma		Bachelor		
	Bachelor Honours		Master		Doctor		
CREDIT VALUE					**40**		

RATIONALE OF THE QUALIFICATION

The Botswana Vision 2036 states that development of the human capital and the informal sector and the micro and small enterprises (MSES) are essential in achieving the VISION 2036 pillars, Sustainable Economic Development and Human and Social Development. Although Botswana has been fortunate to experience unprecedented economic growth since independence, this has not generated enough jobs to reduce unemployment. The most severely hit group amongst the unemployed is the youth, who account for about 51.7 % of the total unemployed, with the 15-19 age group most affected. Hence, the youth after attaining this qualification will acquire the necessary skills sought by the energy sector which in turn reduces unemployment in this age bracket.

The Botswana Education and Training Sector Strategic Plan (ETSSP 2015-2020) marks significant milestone in our collective efforts as a nation to bring about a more diversified, knowledge-based economy. Through a planned and careful development of human capital, the ETSSP seeks to refocus the education and training towards fulfillment of social and economic aspirations identified in our Revised National Policy on Education (RNPE), the National Development Plan, Vision 2036 and as well as the Millennium Development Goals. In particular, the ETSSP is intended to strengthen the match between qualifications and labour market requirements, thereby ensuring that education and training outputs are more closely aligned to socio economic development needs of the country. In line with this strategic goal,

the HRDC report on top occupations of 2016 has identified renewable energy as some of the priority skills for the Mining, Minerals, Energy and Water Resources sector. Graduates with Solar energy qualification will enter the job market, absorbed by the Energy sector. Self-employment is also an advantage since energy equipment, solar heating systems, solar photovoltaic equipment, and engineering services are the best sub-sector prospects.

Based on the above mentioned as well as discussions from the Solar Energy Endorsement meeting with stakeholders, this qualification will close skill gaps in the solar energy field. Through the skills attained, learners will have an opportunity to be entrepreneurs in the energy sector where they will be engaged in the business of supplying and installing renewable energy products. As such, solar energy has the potential to meet the social and economic energy demand for Batswana in a sustainable manner. From the National Energy Policy Implementation Strategy, it is stated that the second pillar of Botswana's renewable energy policy is the use of solar energy. Given the high availability of solar energy throughout the country, several technologies have been identified to best make use of this resource such as Photovoltaic (PV), solar towers and solar heaters. This solar energy qualification will thus equip learners with relevant skills to enter the job market.

PURPOSE

The purpose of the qualification is to equip candidates with competence to perform a range of functions including:

- Application of occupational health and safety practices in work settings.
- Ability to use tools/equipment and machinery,
- Perform craft related calculations,
- interpreting basic engineering drawings in construction.
- erection of mounting structures for solar panels with accordance with established codes of practice and relevant legislation.

People holding this qualification should be able to perform routine work under supervision and take some responsibility for own learning and completion of work.

ENTRY REQUIREMENTS (including access and inclusion)

Minimum entry requirement for this qualification is a:

NCQF level 2, Certificate II (General Education or TVET) or equivalent

Recognition of Prior Learning (RPL):

There will be access through Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) in accordance with the RPL and CAT National Policies.

QUALIFICATION SPECIFICATION SECTION B	
GRADUATE PROFILE (LEARNING OUTCOMES)	**ASSESSMENT CRITERIA**
Communicate with clients, colleagues and others using appropriate forms of communication techniques.	• Use written, verbal, non-verbal communication appropriate to the target audience. • Interpret stipulated instructions or requirements • Apply information acquired in the performance of tasks or discussions with other people • Apply relevant definitions, terminology, abbreviations and language. • Present information using appropriate language and formats. • Construct clear sentences to produce a written logical and coherent piece of writing. • Use appropriate presentation formats and styles of writing to produce error free business documents.
Utilize ICT for information retrieval and processing as well as communication and collaboration with others	• Utilize ICT responsibly and ethically. • Manage information using ICT. • Organize and synthesis information using ICT. • Implement data loss prevention strategies using ICT • Present information in a variety of formats using ICT
Select and use hand tools, power tools and workshop equipment for an engineering application.	• Examine the job specification to determine tools and equipment to be used in relation to occupational safety code. • Select appropriate tools and equipment to be used in line with the job requirements. • Carry out maintenance of hand and power tools in accordance with manufacturer's instructions and organizational requirements

	• Carry out processes as per the job specification, adhering to health, safety and quality standard. • Clean tools and store them in an appropriate place after use.
Install basic renewable energy system.	• Examine job specification to determine the Materials, tools and equipment to be used. • Select the right components and accessories to be used in a circuit as per job instruction. • Locate the area where photovoltaic system shall be installed. • Prepare the workstation for the work to be done. • Install the system. • Work on the circuits as per job instructions • Clean or tidy up the work area in accordance with organizational requirements
Apply basic mathematical concepts to perform work related calculations.	• Carry out basic mathematical operations. • Solve basic algebraic expressions or equations. • Calculate electrical quantities. • Demonstrate knowledge of basic trigonometric concepts.
Read, interpret and draw Engineering drawings for specific purpose	• Examine the nature of work to be carried out to determine the drawing tools and equipment to be used. • Select engineering drawing equipment in line with the job specification. • Produce drawings and orthographic representations for specified projects in accordance with established codes of engineering drawing practice and associated conventions. • Perform quality checks on work done and make improvements where needed. • Clean tools and equipment and store them in appropriate places after use.

	• Clean or tidy up the work area in accordance with organizational requirements.
Apply basic Electrical Principles.	• Demonstrate knowledge of electrical theorems and laws. • Understand effects of electricity • Calculate electrical quantities • Understand simple electrical components and circuits • Wire basic electrical circuit
Perform measurements on photovoltaic components according to job specifications, use of relevant electrical testing and measuring equipment.	• Examine job specification to determine the tools and equipment to be used. • Plan and prepare for work in accordance with the job specifications and organizational requirements. • Select appropriate measuring instruments according to specified limits, fits and tolerance on the job. • Measure all dimensions in accordance with standard specifications and tolerances by using various precision measuring instruments, adhering to health, safety and quality standard • Record, compare and confirm measurements results in line with standard specifications.

QUALIFICATION STRUCTURE

SECTION C

	Title	Level	Credits
FUNDAMENTAL COMPONENT Subjects / Units / Modules /Courses	Communication Skills.	3	3
	Information and Communications Technology	3	3
CORE COMPONENT Subjects / Units / Modules /Courses	Tools and equipment	3	2
	Workshop Practice	3	8
	Renewable energy components and circuits	3	2
	Engineering Mathematics	3	7
	Engineering drawing	3	7
	Electrical and Electronic Principles	3	8
	Grand Total		**40**

Rules of combination, credit distributions (where applicable**)**

Candidates are required to achieve a minimum of 40 credits for the qualification inclusive of 6 credits for fundamentals units and 34 credits for core components.

Credit distribution: Level 3 - 40 credits.

ASSESSMENTS AND MODERATION ARRANGEMENTS

ASSESSMENT ARRANGEMENTS

All assessments, formative and summative, leading/contributing to the award of credits or a qualification should be based on learning outcomes and/or sub-outcomes.

Formative assessment

Formative assessment or continuous assessment contributing towards the award of credits should be based on course outcomes. The contribution of formative assessment to the final grade shall be **60%.**

Summative assessment

Learners shall undergo assessment including written and practical and simulated projects. The final examination for each course contributes **40%** of the final mark for that course.

MODERATION ARRANGEMENTS

Internal and external moderators to be engaged will be BQA accredited subject specialists in relevant fields with relevant industry experience and academic qualifications.

Both internal and external moderation shall be done in accordance with applicable policies and regulations.

RECOGNITION OF PRIOR LEARNING (RPL)

There shall be provision for award of the qualification through Recognition of Prior Learning (RPL) in accordance with institutional Policies in line with the National RPL Policy.

Candidates may submit evidence of credits accumulated in related qualification in order to be credited for the qualification they are applying for.

PROGRESSION PATHWAYS (learning and employment)

Horizontal, Vertical and/or Diagonal Articulation (related qualifications of similar level that graduates may consider)

Horizontal Articulation

- Certificate III in Electrical Installations.
- Certificate III in Electronics.

Vertical Articulation

- Certificate IV in Solar Energy.

Employment pathway

- Technical assistant
- Assistant Risk Management officer

QUALIFICATION AWARD AND CERTIFICATION

Minimum standards of achievement for the award of the qualification

A candidate is required to achieve the stipulated minimum of 40 credits inclusive of 6 credits for total fundamental and 34 credits of core components to be awarded the qualification.

Certification

Candidates meeting prescribed requirements will be awarded a certificate for **Certificate III in Solar Energy** qualification in accordance with standards prescribed for the award of the qualification and applicable policies.

REGIONAL AND INTERNATIONAL COMPARABILITY

1**. Namibia Training Authority, Industry Skills Committee for Manufacturing, Engineering & Technology (Namibia). National Vocational Certificate [Solar Installation Technician]. Level 1, Credit Value 40**

This qualification has been developed to assist with the advancement of people across the electrical industry in which solar energy system installations and maintenance are carried out. The intention of this qualification is to assist:

- Those who have been in the workplace for a long time, using recognition of prior learning to assess and recognize workplace knowledge and skills which have been acquired without the benefit of formal education and training.
- New entrants into the field, by describing the learning outcomes required to participate effectively, e.g., in a structured workplace development program.
- Education, training and development providers, by providing guidance for the developing of appropriate learning programs and assessment tools.
- Employers, through identifying and addressing skills gaps, which in turn leads to increased productivity and business objective achievement.

Holders of this qualification are able to apply safety rules and regulations in a solar energy installation environment, demonstrate basic knowledge of electricity, demonstrate basic knowledge of environmental issues relating to solar energy installations, demonstrate correct use of basic measuring instruments, demonstrate knowledge of plumbing principles, demonstrate knowledge of solar energy technologies, draw and interpret basic technical drawings, install solar home systems, perform basic estimations, measurements and calculations, and use and maintain electrical and mechanical tools for solar installations

2. **Saqa; Sbg Civil Engineering Construction (South Africa). National Certificate: Hot Water System Installation- Nqf Level 2 , Credit Value 122**

This Qualification is for any individual who is, or wishes to be, involved as a hot water system installer in the plumbing sector. The individual will perform this activity under the supervision and guidance of a qualified plumber. The Qualification contains all the competencies, skills and values required by a learner who may

wish to work towards becoming a fully qualified plumber by completing the plumbing qualification is at NQF Level 4. This Qualification could be deemed to be an entry level qualification into the plumbing field. .

Assessment strategies employed for this qualification include formative summative assessments inclusive of practical and theory. All evidence pertaining to evaluation of practical work must be reflected in the students' Portfolio of Evidence. Candidates are required to achieve a minimum of 122 credits inclusive of 36 Credits for fundamental units, 69 credits for core and 17 credits for elective units. Learning and assessment should be integrated, and assessment practices must be fair, transparent, valid and reliable. A variety of assessment strategies and approaches must be used. This could include tests, assignments, projects, demonstrations and/or any applicable method. The learner must demonstrate evidence of analytical thinking, problem solving, and integration of theory and practice as deemed appropriate at this level.

3. National Vocational And Technical Training Commission (Pakistan) – Building Electrician – Solar Pv System Installation (Nvqf Level 3; 80 Credits).

The aim of this program is to produce employable Building Electrician who could provide advanced installation and maintenance services of electrical appliance, including off-grid solar photovoltaic (PV) system installation. In addition to this program will prepare unemployable youth to employee in construction industries or as an entrepreneur. To prepare and train students through skill training and enabling them to earn their living either through employment in industry or be self-employed as an electrician

Technical Education & Skills Development Authority (Philipines). Pv System Design National Certificate Iii. –Level 3; 15 Credits

To attain the National Qualification of PV System Design NC III, the candidate must demonstrate in all the units listed. Successful candidates shall be awarded a National Certificate III signed by the TESDA Director General.

The qualification of PV Systems Design NC III may be attained through demonstration of competence through a single comprehensive project-type assessment covering all required units of competency of the qualification.

Assessment focus on the core units of competency. The basic and common units shall be integrated or assessed concurrently with the core units.

Comparability and articulation of the proposed qualification with the ones examined

The qualification designed for Botswana generally compares well with the foreign qualifications noted above in relation to exit outcomes and content scope. The major differences are on the number of credits allocated.

REWIEW PERIOD

This qualification shall be reviewed every five years.